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SUCCESSFUL YIELDS OF SMALL GRAIN

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THE TUSKEGEE EXPERIMENT STATION

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The Tuskegee Agricultural Experiment Station

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SUCCESSFUL YIELDS OF SMALL GRAIN

G. W. Carver, M. S., Agr. Director.

This bulletin, also, is a continuation of 6 and 7 and endeavors to thwart the very prevalent idea that small grain cannot be profitably raised in this section.

THE CAUSE

It is just as applicable to apply the cause and effect rule to every operation of the farm as to the various branches of mathematics, there being no cause without an effect and no effect without a cause. So therefore upon this hypothesis we began our investigations.

Some time was spent in riding about over the country, studying the various large and small patches of grain here and there, noting their growth, resistance to heat, cold, drought, attacks of fungus diseases and insect enemies.

FOUND

The following was very noticeable:

(a) That no barley, but very little rye and wheat were sown as a full grain crop.

(b) The rye rusted badly, being literally red with rust early in the spring before it began to boot. It made poor grazing—not eaten by stock unless forced to do so.

(c) That in places the crop remained poor and produced only a small percentage of a crop.

(d) That wheat was badly affected with loose smut, (ustilago segetum) and Bunt or stinking smut, (Tilletia foetens). Oats also rusted and smutted badly.

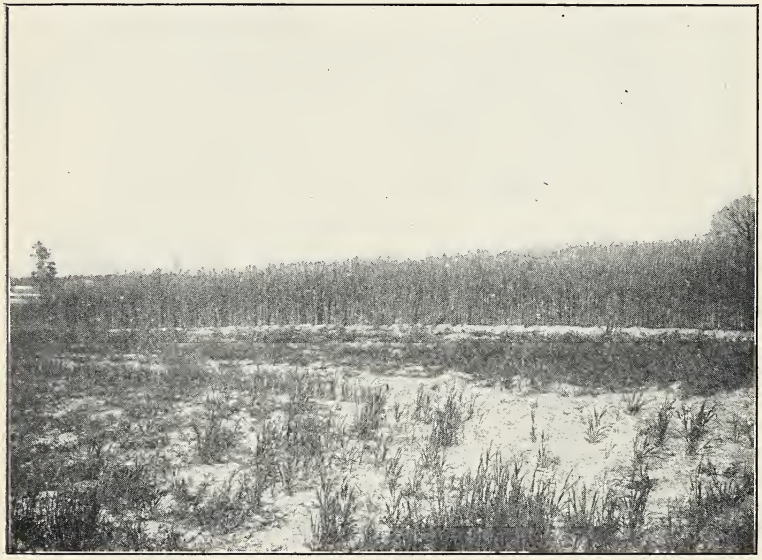
THE CAUSE

Before a remedy could be prescribed the cause must first be determined. The analysis of soil, the microscopic and chemical examination of the plant showed in almost every case a poorly nourished one; hence its susceptibility to diseases.

In nearly every instance where plants showed lack of vigor the soil was deficient both physically and chemically. It was also observed that the seed were oftimes of poor quality and quite as poorly planted. Feeling that sufficient data had been collected for our experimental work it therefore began with the preparation of the soil, which however has been so fully described in Bulletins 6 and 7 that it is hardly necessary to repeat it here.

SELECTION OF SEED

Next in importance was the selection of a good clean seed, which was secured from various reputable dealers, and was further culled by hand, before sowing. The weed seed, faulty grains etc., were removed as far as practicable. The first year the growth and yield was poor (see cut 1).



CUT 1.

Cut one represents a plot of Red Fulsum wheat, April 15, 1898, showing the results of the winter, rust, smuts, and impoverished soil. The seed was purchased until the fifth year of experimentation when the grain was allowed to mature and the yield taken there was however a noticeable increase in the vigor of the plants, resistance to cold, fungus diseases and the adjustment to our soil conditions.

YIELD OF GRAIN IN 1893-94-95

Red Fulsum wheat threshed 15½ bushels to the acre. There was considerable bunt in it, and the grain small, light, and shrunk considerably in drying.

Rye, (Georgia grown) threshed only 15 bushels of inferior grain to the acre. Barley was yet too poor to thrash, smutted very badly. The oats were very good but we did not thresh them out.

1894

Red Fulsum Wheat from home grown seed, carefully hand picked threshed out 20 bushels per acre. Straw rusted considerably just before the grain ripened, the amount of smut was greatly reduced.

Rye home grown 20 bushe'ls per acre, straw comparatively free from rust.

Barley 10 bushels per acre. The smut was not nearly so bad.

1895

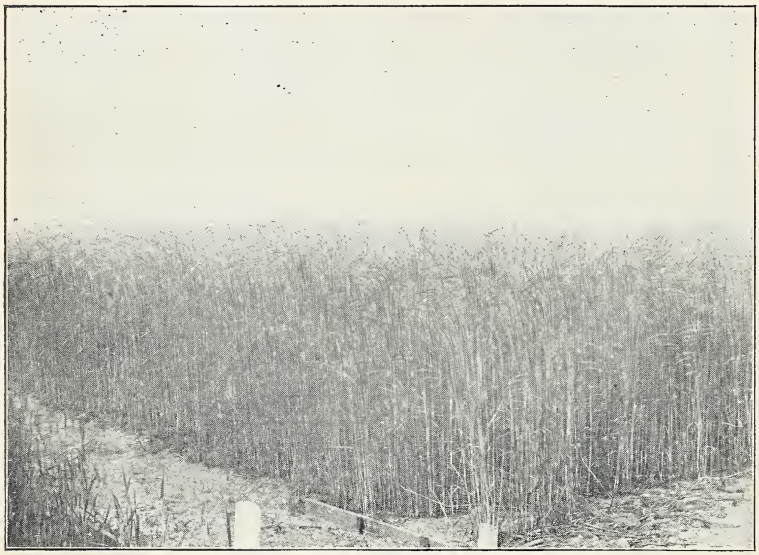
Red Fulsum Wheat made a splendid growth, yielding 35 bush-

CUT 2

els of fine plump grains per acre. The grains did not shrivel in drying, the straw was practically free from rust, no bunt was found, and but little loose smut. Cut No. 2, shows the splendid growth.

Yield of grain per acre, 35 bu. @ $1.35	$ 47.25
Weight of straw, 3000 lbs. @ .50 per hundred	15.00
Value in grazing	5.00
Cost of planting and harvesting	15.00
Net returns on the wheat crop	52.00
Cost of breaking land and sowing in the speckled cow peas	14.00
Yield per acre, 20 bu. @ .75 per bushel	15.00
Cost of all operations	29.00
5000 lbs. of green vines @ .35 per hundred	17.50
Total net returns on the acre	70.75

Cut No. 3 represents a plot of rye which was almost phenom-



CUT 3

enal in growth, it was so luxuriant. It was uniformily 5½ ft. high, and the grains very large and plump. The straw was practically free from rust, just a little here and there being found.

The following interesting data was brought out in this experiment: Two plots were chosen, the ground prepared and seeded in the same way and at the same time. Upon the 1st plot 4 bushels of seed were put per acre; on the 2nd, 2 bushels per acre, (just half the amount). The yield of grain and straw was as follows:

Yield of grain per acre, 24 bu. @ $1.20 per bu.....	$28 80
4500 lbs. of straw @ 50c per hundred.....	22 50
Value in grazing.....	5 00
Cost of planting and harvesting.....	15 00
Net returns on rye crop.....	41 30
Cost of preparing land, fertilizers, planting and harvesting a crop of cow peas.....	14 00
Yield per acre (speckled peas), 20 bu. at 75c.....	15 00
5000 lbs of green vines at 35c per hundred.....	17 50
Net returns for the pea crop.....	18 50
Total gain upon the acre	59 80

Had the peas been held until spring they would have been worth $1.25 per bushel.

CUT 4

The peas were cut off early, they sprouted and covered the ground and were turned under. In calculating the total value of a well grown acre of cow-peas, the following is important to note: that chemical investigations show that the roots deposit $25.00 worth of nitrogen in the soil, plus the organic matter and other constituents coming from the vines. Plot 2, of this experiment was much thinner, not so uniform in height (see cut 4).

It gave the following yield:

Yield of grain per acre, 12 bu. at $1.20 per bu.....	$14 40
2,200 lbs. of straw at 50c per hundred.....	11 00
Value in grazing.....	2 50
Cost of planting and harvesting.....	13 60
Net returns on crop	14 30
The yield of peas was exactly the same as for the first plot thus netting as a total gain upon the acre....	32 80

A difference of $27.00 in favor of thick seeding.

September 8, 1904 a plot of barley was sown putting 3¾ bushels to the acre. It germinated September 12, despite the drought which covered a period of nearly nine weeks. It lived and grew a little during this very trying period, while oats, wheat and rye sown at the same time did not even sprout, but lay in the ground and came up thickly a few days after the first rain.

CUT 5

The barley furnished light grazing December 1. By April 22, it was in the the thick dough state and by April 29–'05, was ready to harvest (see cut 5).

Yield in grain per acre, 20 bu. at $1.15 per bu.....	$23 00
3,000 pounds of straw at 50c per hundred.....	15 00
Value in grazing.	7 00

Cost of planting and harvesting.	15 00
Net returns on barley crop.....	30 00
The yield of pea vines etc. was the same as the previous plots making a total gain per acre of ..	48 50

The meteorological data for several months is given in order that the reader may comprehend the normal as well as the abnormal weather conditions. The following data is submitted showing the amount of rain-fall during the months of April, May, June July, August, September, October, for the years of 1900–01–02–03–04 and '05. (See table at the back.)

CUT 6

The tables show very conclusively that a drought is likely to set in in May and run through June, making it especially important for our light, sandy soils to be prepared good and deep to catch a large supply of water, and that the dust mulch be started at the first approach of the drought. Also that fall grain should be put in early in September lest a drought set in the latter part of the month and extend well up into October, making it so late that winter killing is likely to occur.

The Burt oat deserves special mention here despite the fact that it is tender and unreliable as a winter oat. A plot was sown October 8, grew off very fast, winter killed about one fifth, but stooled in the spring and covered the ground. It was ready to cut April 26. It stood uniformly from 3½ to four feet high and gave a yield of 7500 lbs. of green forage per acre.

The figure in the above cut is standing in a plot of Burt oats.

In his left hand there is a bunch of the Burt ready to cut, (four feet high. In the right is a bunch of Winter Turf Oats planted at the same time and along side of the Burt, (see cut 6), height six inches without any sign of booting.

CONCLUSIONS.

From the above experiments we can safely conclude:

1st. That it pays to prepare the land good and deep for small grain.

2nd. That good, clean seed is of the utmost importance.

3rd. That by the selection of clean seed and thorough preparation of the land and the proper rotation of the crop, the various diseases can be worked out of, or reduced to the minimum in both the plant and the soil.

4th. That a crop of pea vines turned under is a most valuable fertilizer for small grain.

5th. That small grain can be sown when the ground is very dry without injury to the grain. It is important that the soil is not moist enough to simply sprout the seed and not sustain life or the crop may be wholly lost.

6th. That wheat, rye, oats and barley can be made a paying crop on Macon county soils.

GEO. W. CARVER.

METEOROLOGICAL DATA

1900

April		May		June		July		August		September		October	
Rainy days	Amt. of Rain in in.	Rainy days	Amt. of Rain in in.	Rainy days	Amt. of Rain in in.	Rainy days	Amt. of Rain in in.	Rainy days	Amt. of Rain in in.	Rainy days	Amt. of Rain in in.	Rainy days	Amt. of Rain in in.
4	.09	1	.21	2	.03	3	.04	4	.04	1	.31	3	.01
8	.30	9	.30	3	.34	4	.40	5	.18	2	.02	4	.85
11	.46	18	.03	4	.09	11	.11	6	.60	8	13	5	.08
18	3 00	21	.33	5	.02	12	.08	10	.07			10	.45
19	.96	23	.31	7	.10	13	.02	12	.15			22	.63
23	.18	31	.33	8	.56	14	2.25	15	1.90			24	.63
29	.94			13	.34	15	.02	23	.90				
				15	.04	18	.12	26	.58				
				17	.24	23	.02	27	.30				
				19	.24	24	.44						
				22	.39	26	.09						
				23	.57	27	1.28						
				24	.05	28	.11						
				25	.30	29	.25						
				26	.01	30	.02						
				27	.91								
				28	.40								
				29	.43								
7	5.93	6	1.63	18	5.06	15	5.22	9	4.72	3	.46	6	2.65

1901

1	.01					1	.34	5	.07	1	.01	1	1.20
2	.88					2	.30	6	.22	13	.05	12	.09
4	.06					5	.19	7	.86	16	.15		
12	.05					8	.13	11	1.58	17	.84		
13	.70					15	.49	14	1.69	28	1.02		
18	1.21					18	.09	16	.06				
19	.83					31	.83	19	.06				
								20	.87				
								22	1.33				
								24	.05				
7	3.74					7	2.37	10	6.70	5	2.07	2	1.29

1902

3	.30	14	.48	18	.20	4	.60	2	.30	3	.20	4	.70
7	1.00	15	1.19	20	.37	12	.35	11	.20	4	.60	9	.59
15	05	16	.25			13	.08	15	.21	24	2.08	26	2.24
		17	.25			15	.80	24	.07	29	49		
						21	.12	27	.20	30	.17		
						29	.16	28	1.40				
3	1 35	4	2 17	2	.57	6	2.11	6	2.38	5	4.26	3	3.53

1903

4	.38	7	.89	1	.63	4	.25	7	.15	3	.42	8	.70
7	.81	8	.20	4	1.40	8	1.17	9	.25	15	2.10	15	.40
8	.89	9	.10	8	.50	10	.02	16	.25			16	.29
12	.23	12	.33	11	.04	13	.36	19	.47			17	.40
14	.78	13	.57	22	.02	23	.58	20	.27				
26	.80	14	.36	26	.75	24	.70						
		31	.16	27	.71	25	.45						
						31	.35						
6	3.89	7	4.64	7	4.95	8	3.86	5	1.39	2	2.52	4	1.79

1904

6	.38	17	1.30	9	.38	8	.39	4	1.06	3	.57	5	.12
8	.70	30	1.02	29	.71	13	.88	8	.48	5	.10		
28	.05	31	2.38	30	.28	19	.05	11	.05	7	.11		
						22	.21	19	.05				
						23	.05	20	.31				
						25	.56	25	.08				
						29	.10						
3	1.13	3	4.70	3	1.37	7	2.24	6	3.03	3	.78	1	.12

1905

5	2.30	4	.47	1	.23	7	.32	8	.33	27	.30	4	.67
8	.51	8	.23	5	1.00	10	.87	9	.41	28	.05	8	.02
9	.13	22	.62	6	1.00	16	.02	10	.34	29	.15	9	.05
12	.67	30	.35	12	.23	21	.10	11	.13			10	.93
21	.08					24	2.60	14	.05			15	.64
27	.30					28	1.85	16	.40			25	.76
28	.02					29	.84	23	.25				
						30	.98						
7	4.01	4	1.67	4	2.4	8	6.58	7	191	3	.50	6	3.07